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GUIDE TO
RESEARCH IN AIR POLLUTION
(Colleges, Universities & Research Inst.)

Third Edition
October, 1956

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GUIDE TO
RESEARCH IN AIR POLLUTION
(Colleges, Universities and Research Institutes)

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Committee on Air Pollution Controls
The American Society of Mechanical Engineers
New York, N. Y.

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RESEARCH IN AIR POLLUTION
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In the report of the first survey on air-pollution research (Mechanical Engineering, Vol. 75, pp. 712-714, September, 1953) indications were that some 37 institutions were engaged in such activity. In the second report, some 45 organizations reported similar work. This third report lists 68 organizations now engaged in such research.

Whether or not such expansion is desirable in that it discloses further duplication, there is little doubt that it reflects the tremendous interest now raging in the field of air-pollution control. As a result of this rapid impetus, these reports will be revised every year.

The earlier reports proved to be of service to industry, trade associations, foundations, and committees in the placement of research projects. The present report should be of increased value because of the wider choice presented.

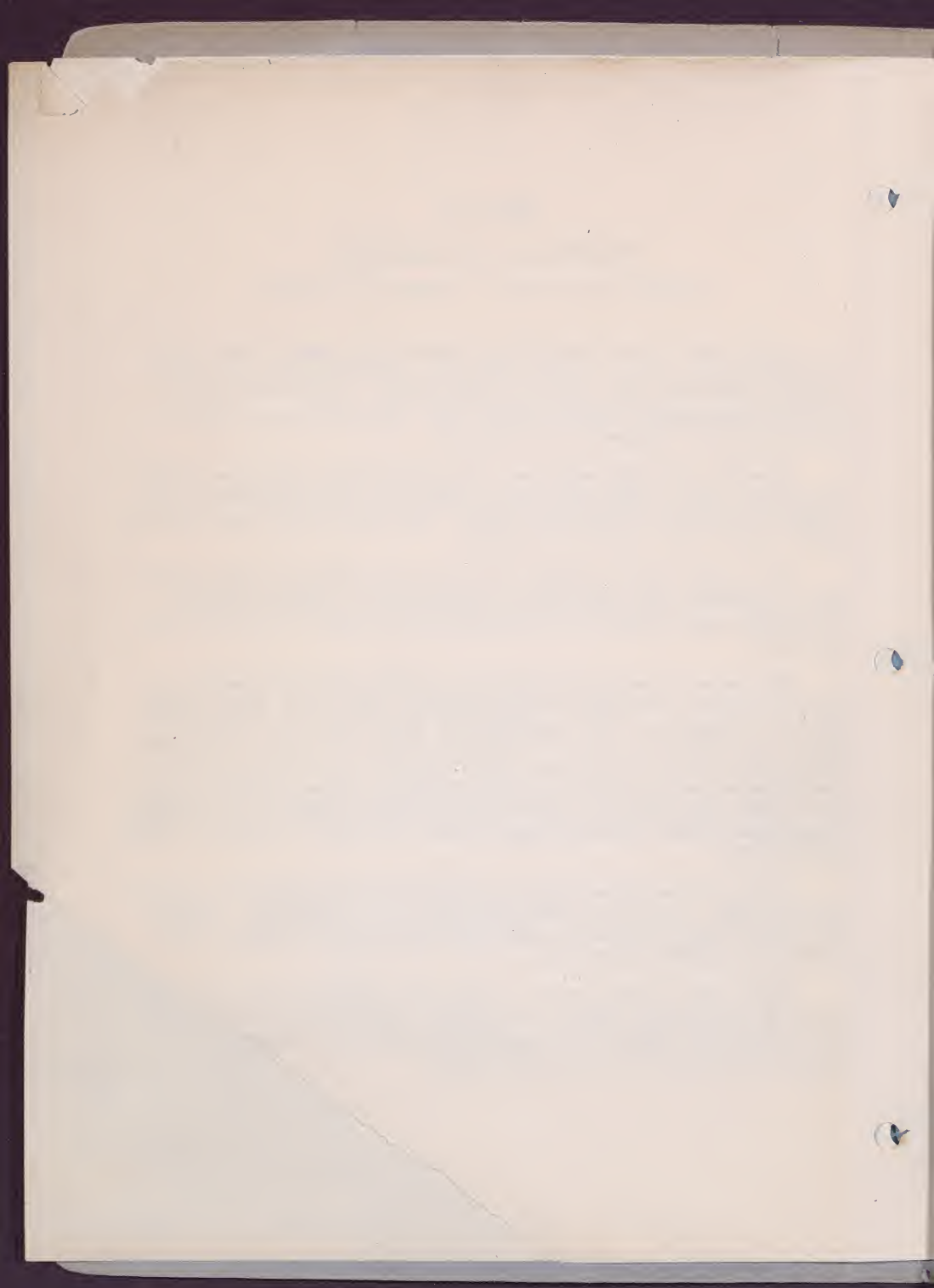
This report is one of the continuing activities of the Subcommittee on Current Projects and Trends, of which Arthur C. Stern, U. S. Public Health Service, is Chairman. Other members are: R. C. Corey, U. S. Bureau of Mines; L. L. Falk, E. I. du Pont de Nemours & Co., Inc.; and W. A. Schmidt, Western Precipitation Corporation. For assistance in the distribution of questionnaires and compilation of replies, grateful acknowledgment is made to the staff of the Community Air Pollution Program, Robert A. Taft Sanitary Engineering Center. Editing and reproduction of the report was done at ASME Headquarters.

Another subcommittee report on air-pollution instruments has recently been published. A report on control equipment is in preparation. Copies of both reports may be obtained by addressing the executive secretary of the Committee at ASME Headquarters.

Neither The American Society of Mechanical Engineers nor its Committee on Air Pollution Controls can assume responsibility for the analysis of the statements made by the responding organizations. Recommendation of the research groups is not made nor implied.

Info. Contact: Richard

ing device; (b) two area
of SO₂ levels near two large
ation surveys involving the
large industrial operations;



AIR POLLUTION FOUNDATION*, 704 South Spring Street, Los Angeles 14, California

(a) Comparison of oxidant levels at Pasadena by four methods of measurement; (b) design and construction of phenolphthalein and ferric thiocyanate continuous oxidant recorder; (c) development of atmospheric hydrocarbon recorder; (d) further correlation of wind trajectories with data from 1954 aerometric survey; and (e) further development of ozone spectrometer.

(*Primarily a sponsor rather than directly engaged in research)

ARGONNE NATIONAL LABORATORY, P. O. Box 299, Lemont, Illinois. Contact: Harvey A. Schultz and Harry Moses.

(a) Development of instrument for determination of small amounts of halogens in atmosphere; (b) dispersal patterns of stack effluents; (c) study of relationships between atmospheric diffusion and meteorological parameters utilizing experimental stack; (d) development of equipment for investigation of atmospheric turbulence; (e) climatology pertaining to atmospheric pollution. Results: Climatological studies available as Argonne National Laboratory reports, ANL-4538, ANL-4793, ANL-4928, ANL-5256. Description of equipment available in ANL-5288 and ANL-5378. Also Bulletin of American Meteorological Society, Vol. 36, No. 1, January 1955. Sponsor: Atomic Energy Commission.

ARMOUR RESEARCH FOUNDATION, (Illinois Institute of Technology), Chicago, Illinois.

✓(a) Development of instrument for rapid analysis for ozone in the atmosphere; (b) electronic instrumentation for rapid counting and size determination on atmospheric particulate matter; (c) establishment of standards for dust particle size measurement; (d) efficiency of samplers used in measuring fallout; (e) exploratory study of practical catalysts for decomposing NO. Sponsors: (a) American Petroleum Institute, (b) Air Force, (c) Air Pollution Control Association, Committee T-12 and Armour Research Foundation, (d) Atomic Energy Commission, (e) Air Pollution Foundation.

AUTOMOBILE MANUFACTURERS ASSOCIATION*, New Center Building, Detroit 2, Michigan

(a) Determination of Los Angeles traffic pattern; (b) development of exhaust hydrocarbon control devices; (1) induction system devices and, (2) exhaust system devices; (c) evaluation of relationships of crankcase breather emissions to exhaust emissions; (d) studies of the effect on visible exhaust smoke of engineer design, engine condition and engine loads; (e) studies of the effect on visible exhaust smoke from fuel and lubricant characteristics; (f) methods of taking and preserving samples of exhaust gas prior to analysis; (g) methods of analyzing constituents of exhaust gas.

(* Primarily a sponsor)

BATTELLE MEMORIAL INSTITUTE, 505 King Avenue, Columbus, Ohio. Contact: Richard B. Engdahl.

(a) Development of a directional air sampling device; (b) two area air pollution surveys involving the measurement of SO₂ levels near two large industrial operations; (c) four area air pollution surveys involving the measurement of particulate levels near four large industrial operations;

Battelle Memorial Institute (continued)

(d) dust-fall and sulfur dioxide measurements in the vicinity of various power plants; (e) measurement of fume concentrations in the vicinity of an electro-metallurgical plant; (f) measurement of fluoride emissions from various manufacturing processes; (g) sampling, analysis and reduction of fume from cupolas; (h) study of methods for controlling emissions from the manufacture of glass fiber products; (i) measurement and analysis of emissions from electric furnaces. Results: Unpublished. Sponsor: (a) Battelle Memorial Institute, (b, c, d, e, f, g, h, i, j) Industry.

BAYLOR UNIVERSITY, Houston, Texas

Preliminary study to determine the feasibility of using tissue enzymes to evaluate the toxicity of air pollutants. Sponsor: Public Health Service.

BITUMINOUS COAL RESEARCH, INC., 980 Kinnear Road, Columbus 8, Ohio. Contact: James R. Garvey.

(a) Investigation of water spray in stacks for reduction of emission during soot blowing; (b) control of smoke from new coal-fired stokers; (c) general investigation into reduction of SO₂ emission from utility power plant stacks. Results: Several publications. Sponsor: Industry.

✓ BOYCE THOMPSON INSTITUTE FOR PLANT RESEARCH, INC., 1086 North Broadway, Yonkers 3, New York. Contact: P. W. Zimmerman, A. E. Hitchcock, et al

(a) Effects of various gases and mixed gases on plants; (b) improvements in sampling of air and methods of analyses for fluorine in both tissue and air; (c) the effect of low concentration of pollutants to determine the minimum amounts in air and tissue which may affect growth; (d) normal content of fluorine in tissue of plants growing under natural habitats; (e) rate of absorption of fluorine by plants growing in industrial areas or when fumigated with known concentrations of fluorides for known periods of time; (f) comparative susceptibility of plants to different industrial gases. Results: Numerous publications. Sponsor: Industrial and Institute.

BROOKHAVEN NATIONAL LABORATORY, Upton, L. I., New York. Contacts: Maynard E. Smith and Irving A. Singer.

(a) Measurement of ground-level concentration of an oil-fog plume from a 350 foot stack; (b) measurement of concentration within an inversion plume; (c) Determination of diffusion coefficients; (d) Effect of scale and time on the diffusion matter.

CALIFORNIA DEPARTMENT OF HEALTH, Berkeley, California

(a) Analyses of mortality of populations exposed to air pollution to determine whether such pollution contributes to death; (b) Study of the sickness experience of populations exposed to air pollution through special

California Department of Health (continued)

surveys of the general population, schools, industrial groups, and admissions to hospitals; (c) investigation of the effect of air pollution on the frequency and intensity of attacks of asthma, hay fever, and other respiratory illness; (d) studies of the influence of air pollution on human performance -- in school, at work, and on the athletic field; (e) studies to further define the nature and mechanism of air pollution in California and to develop a reliable index measurement or measurements; (f) study of the nature and role of aerosols in air pollution; (g) establishment of air monitoring networks in metropolitan areas and large isolated cities; (h) assistance to local agencies in establishing continuing air pollution control programs; (i) basic studies of major sources of air pollution in rural areas; (j) special studies in field at times of unusual air pollution occurrence anywhere in the state; (k) consultation and assistance to local agencies on specific air pollution problems; (l) development of a plan for coping with air pollution emergencies; (m) regular program of dissemination of information on air pollution to all parties and agencies. Sponsor: California Department of Health

CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena 4, California. Contact: A. J. Haagen-Smit.

✓(a) Analytical determinations of ozone, oxides of nitrogen and peroxides. Study of the relation between structure of organic compounds and their ozone forming capacity; ✓(b) hydrocarbon, nitrogen dioxide studies; (c) size distribution and composition of atmospheric aerosols; (d) development of aerosol concentrator; (e) development of an aerosol size-separation instrument. ✓Reprints - "Photochemical Ozone Formation with Hydrocarbons and Automobile Exhaust", Journal of the Air Pollution Control Association and "The Control of Air Pollution in Los Angeles", Engineering and Science Monthly - December 1954. Sponsors: (a) Los Angeles County Air Pollution Control District, (b) California Institute of Technology, (c,d,e) Air Pollution Foundation.

CALIFORNIA, UNIVERSITY OF

Berkeley Campus, Berkeley 4, California. Contacts: Bernard D. Tebbens and Jerome F. Thomas.

Analysis of chemical and physical properties of particles produced by combustion of gaseous and liquid hydrocarbons with various degrees of aeration, etc. Sponsor: Public Health Service

Davis Campus, Davis, California. Contacts: (a) A. S. Crafts, (b) H. B. Schultz.

(a) Plant damage from airborne herbicides; (b) meteorological effects upon herbicide damage to vegetation. Sponsor: University of California.

Los Angeles Campus, Los Angeles, California. Contacts: (a) Fred A. Bryan and Charles M. Carpenter, (b) N. A. Richardson, (c) A. F. Bush, (d) W. D. Hershberger (e) S. T. Yuster and R. Kopa, (f) H. Buchberg, (g) M. Neiberger

University of California, Los Angeles Campus (continued)

and Prof. Z. Sekera, (h) R. L. Pescok and P. S. Farrington, (i) F. E. Romie and W. J. Karplus, (j) M. Tribus.

(a) Study of possible predisposition to pulmonary infection by the irritative action of smog; (b) use of air filtering devices for alleviating air pollution effects; (c) incinerator design; (d) Microwave methods of studying air pollutants; (e) automotive exhaust control devices; (f) design problems on air reaction test facilities; (g) research on properties of aerosol component of Los Angeles smog; (h) chromatographic analysis of gaseous mixtures for trace constituents; (i) prediction of air pollution concentrations; (j) an investigation of the interaction between monomolecular layers of protein similar to that covering the eye and atmospheric pollutants. Sponsors: (a) Public Health Service, (b,c,d,e,f,i,j) University of California, (g) Air Pollution Foundation, (h) National Science Foundation.

Riverside Campus, Riverside, California. Contacts: (a) R. F. Brewer, (b,c,) E. F. Darley, (d) I. L. Eaks, (e) H. T. Freebarin, (f) John T. Middleton and B. A. Roark, (g) John T. Middleton and A. O. Paulus, (h) John T. Middleton, (i) John T. Middleton, E. F. Darley and A. O. Paulus (j) A. O. Paulus, (k) James N. Pitts, (l) B. A. Roark (m,n) O. C. Taylor (o,p) G. W. Todd.

(a) Fluoride toxicity in citrus and grape; (b) plant damage from oxides of nitrogen and reaction products with ozone and hydrocarbons; (c) chemical protection of vegetation from oxidant damage; (d) ethylene toxicity to citrus and floricultural crops and analytical methods for atmospheric sampling; (e) effect of ozone, ozonated hexene, and other oxidants upon plant enzyme activity; (f) studies of plant response to smog; (g) statewide monitoring of air pollution through plant response; (h) use of plants as bio-assay systems for the occurrence and distribution of air pollutants; (i) effect of organic materials in the atmosphere on vegetation; (j) economic loss to agricultural crops in California; (k) structure & photochemical reactivity of ketones; (l) study of the effects of environment upon plant sensitivity to airborne toxicants; (m) effects of air pollution upon water loss in plants; (n) growth and productivity of citrus, avocado and other subtropical fruits in polluted air; (o) physiologic response of plants to ozonated olefins and ozone; (p) gas chromatography for detection of air-borne phytotoxicants. Sponsors: (a,b,c,d,e,g,h,j,l,m,n,o,p) University of California, (f) Air Pollution Foundation, (i) American Petroleum Institute, (k) National Science Foundation.

CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh 13, Pennsylvania. Contact: Gaylord W. Penney.

(a) Study of precipitation at elevated temperature as affected by type of dust; (b) study of basic electric phenomena related to aerosols. Results: Unpublished. Sponsors: (a) Industry, (b) National Science Foundation.

CASE INSTITUTE OF TECHNOLOGY, Cleveland 6, Ohio. Contact: Dr. R. C. Weast

Fundamental investigations of certain reactions occurring in rayon plant air effluents. Sponsor: Industry.

CHICAGO, UNIVERSITY OF, Chicago, Illinois. Contact: Dr. Horace E. Byers.

Chemical identification of particles below microscopic size.
Sponsor: Public Health Service.

CINCINNATI, UNIVERSITY OF, Eden and Bethesda Avenue, Cincinnati, Ohio.

Contacts: (a) Geoffrey C. R. Carey and Irene Campbell, (b) John J. Phair, (c) J. Cholak.

(a) Classified bibliography of atmospheric pollution with reference to its effects on man; (b) the design and organization of a study to relate the incidence, prevalence, and prognosis of human disease to air pollution in an urban area; (c) development of continuous sampling equipment (NO₂ and oxidant recorders), continuous scrubbing equipment, monitoring of air of Cincinnati. Results: (a,b) Work is in progress, (c) Seven or eight publications. Sponsors: (a,b) Public Health Service, (c) University and Industry.

COLUMBIA UNIVERSITY, Department of Chemistry, 668 Chandler Hall, New York 27, New York. Contact: Victor K. LaMer.

✓ Studies of filtration of monodisperse fine solid aerosols (effect of electric charge) in development of filters to protect against A and H bomb debris. Results: Some aspects reported -- U.S. AEC Reports NYO-512, NYO-514, and NYO-4526. Sponsor: Atomic Energy Commission.

COORDINATING RESEARCH COUNCIL, INC.*, Thirty Rockefeller Plaza, New York 20, New York.

(a) Development of analytical methods for components of automobile exhaust; (b) effects of engine variables on composition of automobile exhaust; (c) field survey of automobile exhaust emissions. Sponsors: (Sustaining Members) American Petroleum Institute and Society of Automotive Engineers, Inc.

*Primarily a sponsor - not primarily engaged in research.

DETROIT DEPARTMENT OF HEALTH, Detroit, Michigan. Contact: Joseph C. Molner.

A comprehensive study of the effects of air pollution on health.
Sponsor: Public Health Service.

FLORIDA STATE UNIVERSITY, Department of Meteorology, Tallahassee, Florida.
Contact: Werner A. Baum.

General and basic meteorological research

FLORIDA, UNIVERSITY OF, Engineering and Industrial Experiment Station, Gainesville, Florida. Contact: E. R. Hendrickson.

(a) Dispersion and effects of airborne industrial wastes; (b) determination of the concentration of gaseous fluorine and sulfur compounds in the atmosphere, to determine the effect of varying meteorological conditions on dispersion of air-borne pollutants, and to locate sources. Development of recording instrumentation. Results: Not published. Sponsors: (a) Public Health Service, (b) State of Florida.

FRANKLIN INSTITUTE, Philadelphia, Pennsylvania

(a) Reaction of nitrogen oxides and ozone with organic materials; (b) infrared analysis of Los Angeles atmosphere; (c) investigation of compression sampling. Sponsors: (a,b) American Petroleum Institute, (c) Public Health Service.

GEORGIA INSTITUTE OF TECHNOLOGY, Engineering Experiment Station, Atlanta, Georgia. Contacts: Clyde Orr, Jr., T. W. Kethley, J. M. Dalla Valle.

(a) Studying characteristics of air-borne microorganisms; (b) Studying the forces between particles as they relate to the dispersion of dusts, etc.; (c) investigating the pickup of moisture by air-borne hygroscopic particles with change in relative humidity. The size of the particles is of primary interest. Results: In addition to reports to sponsors and manuscripts in preparation, the following articles have been or soon will be published: Orr, C., and Gordon, M. T., "The Density and Size of Air-Borne Serratia Marcescens," J. Bacteriol., 71, 315 (1956). Orr, C., Jr., Gordon, M. T. and Kordecki, M. C., "Thermal Precipitation for Sampling Airborne Microorganisms," to be published in Appl. Microbiol. Orr, C., Jr., "A Continuous Thermal Precipitator for Aerosol Sampling," presented at the 1956 Industrial Health Conference, Convention Hall, Philadelphia, Penna., April 21-27, 1956. - Kethley, T. W., Fincher, E. L., and Gown, W. B., "A System for the Evaluation of Aerial Disinfectants," to be published in Appl. Microbiol. Kethley, T. W., Orr, C., Jr., Fincher, E. L. and Dalla Valle, J. M., "Airborne Microorganisms as Analytical Tools in Aerosol Studies," to be presented at the Atlantic City meeting of the American Chemical Society, Sept. 1956. Sponsors: (a) National Institution of Health and Air Research and Development Command, (b) Chemical Corps, Camp Detrick, Frederick, Md., (c) Air Force Cambridge Research Center.

HARVARD UNIVERSITY, School of Public Health, Department of Industrial Hygiene, 55 Shattuck Street, Boston 15, Massachusetts. Contact: Leslie Silverman.

(a) Research on fundamentals of air and gas cleaning for U.S. A.E.C.; (b) Fundamental studies on characteristics of open hearth fume and development of methods of removing them. Sponsors: (a) U. S. Atomic Energy Commission and Harvard University, (b) American Iron and Steel Institute.

Harvard University (continued)

Department of Physiology, 55 Shattuck Street, Boston 15, Massachusetts.
Contact: Mary O. Amdur.

Physiological effects on animals. Specifically the application of sensitive methods for studying the mechanics of respiration during exposures of an hour or longer to known concentrations of atmospheric pollutants. Un-anesthetized guinea pigs are the experimental animals. Results: Description of methods and results obtained with sulfur dioxide presented at the 3rd National Air Pollution Symposium, Pasadena, May 1955. Published in Proceedings. Sponsor: Public Health Service.

ILLINOIS, UNIVERSITY OF, Urbana, Illinois. Contact: H. F. Johnstone.

(a) Continuing studies on instrumentation, sources and control of pollution; (b) studies on the absorption and oxidation of sulfur dioxide by fog droplets; (c) the effect of minute traces of metallic salts on the photochemical oxidation of SO_2 in the atmosphere; (d) studies on the fundamental properties of aerosols with small electric charges; (e) studies of the deposition of charged aerosols on cylindrical collectors; (f) methods of determining the size and density of the agglomerates of dust particles; (g) fundamental studies in the filtration of aerosols; (h) studies on new devices for gas cleaning; (i) studies in the economic evaluation of methods for removing SO_2 from gases; (j) studies on new methods of determining the equilibrium vapor pressures of SO_2 over solution; (k) studies on methods of removing the oxides of nitrogen from waste gases; (l) ozone-hydrocarbon aerosols. Results: Numerous publications. Sponsors: (b,c) American Petroleum Institute, (d,f,h,k,l) Atomic Energy Commission, (g) Army Chemical Corps, (i,j) Texas Gulf Sulphur Company.

INDIANA UNIVERSITY, Bloomington, Indiana. Contact: Frank T. Gucker.

A calculation of light scattering from dioctyl phthalate (DOP) Aerosols and the response curves of aerosol particle counters. Sponsor: University.

IOWA, UNIVERSITY OF, Department of Hygiene and Preventive Medicine, 266-A Med. Lab. Building, Iowa City, Iowa. Contact: Roland Rooks.

The efficiency of mechanical filters and air conditioners in the removal of ragweed pollen and fungus spores; and the diurnal variation of air-borne spores as determined by a continuous recording particle sampler. Results: The efficiency of mechanical filters and air conditioners in the removal of ragweed pollen and fungus spores published J. Allergy 27:32-38 (Jan. 1956).

JEFFERSON MEDICAL COLLEGE, 1025 Walnut Street, Philadelphia 7, Pennsylvania.
Heinrich Brieger.

(a) Distribution, deposition and removal of inhaled particulates;
(b) local effects of radioactive particulates deposited in the lung tissue.
Results: Not yet published. Sponsors: (a) Public Health Service, (b) Atomic Energy Commission.

LOS ANGELES COUNTY AIR POLLUTION CONTROL DISTRICT, 434 S. San Pedro Street,
Los Angeles 13, California.

(a) A plant bio-assay method for identifying the chemical components of smog; (b) effect of smog on susceptible plants; (c) development of automatic recording instruments for hydrocarbons, nitrogen dioxide, and ozone; (d) air movement studies; (e) construction of a telemetering system to connect air monitoring and weather instruments; (f) investigations to determine the constituents and precursors of smog, and to determine the effect of weather on smog formation; (g) evaluation of data from the District and other agencies; (h) compile and evaluate source testing and other data; (i) evaluation of suggestions and inventions; (j) re-evaluation of air pollution sources in oil refineries and steam power plants; (k) determine auto exhaust emissions under varying conditions of engine operation; (l) study of the feasibility of control of oxides of nitrogen. Sponsors: (a) Public Health Service, (b-1) Los Angeles County.

LOUISIANA STATE UNIVERSITY, Baton Rouge, Louisiana. Contact: Dr. Philip W. West.

Gas chromatography applied to air pollutants. Sponsor: Public Health Service.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Department of Meteorology, Round Hill Field Station, South Dartmouth, Massachusetts. Contacts: Frank A. Record and Harrison E. Cramer.

(a) Studies on the structure of atmospheric turbulence and its relationship to the diffusion of aerosols from a continuous point source; (b) simultaneous measurements of time-mean aerosol concentrations and meteorological parameters over 800 m range from a continuous point source. Results: Several publications. Sponsor: Air Force Cambridge Research Center.

MEDICAL EVANGELISTS, COLLEGE OF, Los Angeles, California.

The effect of air pollutants, singly and in combination, on living tissue free of virus infection, as compared with infected tissue. Sponsor: Public Health Service.

MICHIGAN, UNIVERSITY OF, Ann Arbor, Michigan. Contacts: E. Wendell Hewson, John M. Sheldon and R. H. Sherlock.

(a) Atmospheric pollution by aeroallergens; (b) measurement and analysis of wind speed and direction, atmospheric turbulence, and lapse rate records; (c) studies on control of stack gases. Sponsor: (a) Public Health Service, (b,c) Industry.

MIDWEST RESEARCH INSTITUTE, 425 Volker Boulevard, Kansas City 10, Missouri.

(a) The role of auto exhaust in smog formation; (b) investigation of the smog-forming potential of several fuels. Sponsor: (a) Air Pollution Foundation, (b) Industry.

MINNESOTA, UNIVERSITY OF, Minneapolis, Minnesota. Contacts: Dr. R. C. Jordan, Prof. A. B. Algren, Dr. K. T. Whitby.

Engineering studies designed to develop and evaluate testing and rating methods for air-cleaning devices. Development of particle sampling and evaluation instruments. Sponsor: Public Health Service and the American Society of Heating and Air Conditioning Engineers.

NATIONAL BUREAU OF STANDARDS, Washington 25, D. C.

(a) Work on kinetics of reactions between common pollutants in the air under radiation; (b) study of methods of sampling to determine character and amount of pollutants in the gas phase; (c) completion of facilities for the conduct of photolysis with known synthetic mixtures and their subsequent study of mass spectrometry and infrared spectrometry with or without preliminary fractionation by gas chromatography; (d) development of gas chromatography as an accessory to the analysis of pollutants by mass spectrometry and infrared spectrometry; (e) further development of a mass spectrometer with heated inlet for the study of particulate matter; (f) development of methods for determining pollutants by quick and simple methods. At present working particularly on acetylene. Sponsor: Public Health Service.

NEBRASKA, UNIVERSITY OF, Lincoln Nebraska.

Study to determine the feasibility of using tissue culture to evaluate the toxicity of air pollutants. Sponsor: Public Health Service.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, Socorro, New Mexico. Contact: W. D. Crozier.

(a) Study of the properties of airborne ice particles; (b) attempts to distinguish airborne particles of meteoritical origin. Results: Numerous publications. Sponsor: Office of Naval Research.

NEW YORK UNIVERSITY, College of Engineering, Research Division, University Heights, Bronx 53, New York. Contact: Harold K. Work.

(a) Scale model wind tunnel investigations on stack gas dispersal; (b) field meteorological investigation of wind and temperature structure at site of proposed plants; (c) development of equipment and techniques for the simulation of atmospheric temperature gradients with particular reference to thermally induced turbulence; (d) study of exhaust gas dispersal for present and proposed plants; (e) aim of project is to advise on atmospheric pollution problems in connection with proposed nuclear power plant and to recommend solutions. Results: (a,b,c) Several publications, (d) Testing is now in progress and a model is under construction, (e) work in progress. Sponsors: (a,b,c) Industry and Engineering Research Division and Atomic Energy Commission, (d,e) Industry.

OHIO STATE UNIVERSITY, Columbus 10, Ohio. Contact: G. E. Dryden.

(a) Performance studies of tray-type gas or vapor scrubber; (b) Photoactivated surface reactions. Results: Unpublished. Sponsors: (a) Ohio State University, (b) Air Pollution Foundation.

OREGON STATE COLLEGE, Corvallis, Oregon. Contacts: O. C. Compton and L. F. Remmert.

Study of accumulation of fluorine by plants growing in the vicinity of two aluminum reduction factories and in control areas. Sponsor: Oregon State Board of Higher Education.

PENNSYLVANIA STATE UNIVERSITY, University Park, Pennsylvania. Contacts: Hans Panofsky and Dr. William E. Ranz.

(a) Relationship of turbulence spectra to mean meteorological parameters; (b) study of the wash-out efficiency of water drops; (c) comparison of spectra at Brookhaven and O'Neill, Nebraska; (d) analysis of mist and dust collection equipment. Sponsors: (a,c) Air Force Cambridge Research Center, (b) Pennsylvania State Research Fund, (d) Public Health Service.

PITTSBURGH UNIVERSITY OF, School of Public Health, Pittsburgh, Pennsylvania. Contact: Theodore Hatch.

Influence of air pollutants on the heart and lungs. Sponsor: Public Health Service.

ROCHESTER UNIVERSITY OF, School of Medicine and Dentistry, (Atomic Energy Project) P. O. Box 287, Station 3, Rochester 20, New York. Contacts: (a) S. Black and W. F. Bale, (b) R. D. Armstrong and E. A. Maynard, (c) K. E. Lauterback and R. H. Wilson, (d) E. A. Maynard, (e) J. N. Stannard, (f) R.H. Wilson and E. A. Maynard.

University of Rochester (continued)

(a) Measurement of radiation dose to lungs from radon and thoron degradation products; (b) pulmonary granulomata in rats following inhalation of beryllium fume; comparison in Saranac and Rochester strains; (c) methods of producing, sampling and characterizing aerosols. Development of special instruments; (d) inhalation and oral toxicity studies in animals of compounds of interest to the Atomic Energy Commission; (e) Toxicity and effects of inhaled alpha particle emitting radioactive materials; (f) study of chronic chemical and radioactive effect in animals inhaling uranium dioxide dust; deposition and retention of insoluble uranium. Sponsor: Atomic Energy Commission.

SOUTHERN CALIFORNIA, UNIVERSITY OF, Los Angeles, California. Contacts: (a) Hurley L. Motley, (b) P. R. Merrifield.

(a) Investigation of the effect of breathing smog air on pulmonary function in man; (b) extent and seriousness of eye irritation caused by air pollutants; (c) effect of humidity on production of aerosols and eye irritation. Sponsors: (a,b) Public Health Service, (c) Los Angeles County Air Pollution Control District.

Southern California, University of, School of Medicine, 1200 North State Street, Los Angeles 33, California. Contact: Paul Kotin.

Studies of the acute, subacute, and chronic effects of air pollutants. Toxicological effects of single and combinations of pollutants. Possible carcinogenic effects of polluted air. Results: Numerous publications. Sponsor: Public Health Service.

SOUTHERN RESEARCH INSTITUTE, Birmingham 5, Alabama.

Study of the contribution of foundry cupolas to the atmosphere in Chattanooga, Tennessee. Sponsor: Industry.

SOUTHWEST RESEARCH INSTITUTE, 9500 Culebra Road, San Antonio 6, Texas. Contacts: Dr. Louis Koenig and Dr. Herbert C. McKee.

(a) Design and evaluation of methods of protection against air-borne toxic gases and aerosols, for use by military forces; (b) study of environmental factors in causing fluorosis in livestock, including air-borne contaminants; (c) analysis of air in aircraft cabins for combustible vapor from gasoline, jet fuel, rocket fuel, or oxidizer, from a safety standpoint; (d) a study of particulate matter from auto exhausts. Results: (a) Classified - Military, (b) Classified - Industrial, (c) Results may be published depending on the outcome of the work. Sponsor: (a,c) Government agencies, (b) Industry, (d) Public Health Service.

STANFORD RESEARCH INSTITUTE, Stanford, California. Contacts: K. E. Lunde and Dr. R. D. Cadle.

(a) Air pollution as a factor in plant site selection; (b) areal distribution of fluoride in vegetation; (c) effects of fluorides on cattle; (d) composition of automobile exhaust; (e) comparison of aerosol sampling techniques; (f) reactions in Los Angeles smog; (g) oxidant and nitrogen oxide measurements in Los Angeles; (h) fumigation of selected plants with Los Angeles smog; (i) eye irritation tests with Los Angeles smog; (j) development of continuous analytical instruments; (k) development of dust collection equipment; (l) determination of the amount of plant damage produced by automobile engine exhaust in the presence of ozone; (m) sulfur dioxide studies; (n) pilot plant work on control equipment; (o) dust deposition studies; (p) city air pollution problems; (q) investigation of smog filters; (r) heterogeneous chemical reactions in aerosol systems. Results: Numerous publications. Sponsor: Private industry, public and private associations, Federal Government, and Stanford Research Institute.

TENNESSEE, UNIVERSITY OF, Agricultural Experiment Station, Knoxville, Tenn. Contacts: C. S. Hobbs and L. J. Hardin.

Effects of atmospheric effluents on plant and animal life.

Sponsor: Animal Husbandry Department and Agronomy Department.

TEXAS, UNIVERSITY OF, Electrical Engineering Research Laboratory, P. O. Box 8026, University Station, Austin, Texas. Contacts: John R. Gerhardt and Cullen M. Grain.

(a) Measurement of the fluctuations of microwave refractive index in atmosphere using ground based and airborne instruments; (b) studies of heat and water vapor transfer from water surfaces; (c) studies of the dispersion of point source smoke clouds. Results: Several publications. Sponsor: Government Contract.

TOLEDO, UNIVERSITY OF, Research Foundation, 2801 W. Bancroft Street, Toledo 6, Ohio. Contacts: Archie N. Solberg, Harold C. Shaffer and Gilbert Kelley.

Techniques of collecting airborne organisms. Results: Ohio Journal of Science, September, 1956. Sponsor: Company.

U.S. AIR FORCE CAMBRIDGE RESEARCH CENTER, Laurence G. Hanscom Field, Bedford, Massachusetts. Contact: Morton L. Barad.

(a) Background studies of the physics of the first 5000 feet of the atmosphere; (b) studies of gas and aerosol diffusion in the atmosphere; (c) studies in the forecasting of micro-meteorological parameters. These studies are conducted under contract as well as by in-house staff. Sponsor: Department of the Air Force.

U. S. ATOMIC ENERGY COMMISSION, Health and Safety Laboratory, P. O. Box 30, Ansonia Station, New York 23, New York. Contact: William B. Harris.

(a) Generation of solid mono-dispersed aerosols; (b) testing of filter media for sampling and air cleaning; (c) classified projects. Results: No publications. Sponsor: U. S. Government.

U. S. BUREAU OF MINES, Petroleum Experiment Station, Bartlesville, Oklahoma.

(a) Evaluation and development of gas chromatographic methods for analysis of automobile exhaust; (b) influence of fuel composition on composition of automotive engine exhaust gases. Sponsor: (a) Coordinating Research Council, (b) Public Health Service.

U. S. BUREAU OF MINES, Pittsburgh, Pennsylvania.

(a) Development of incinerator for disposal of radioactive wastes; (b) investigation of incineration of combustible refuse; (c) cost analysis and experimental studies of SO₂ removal. Sponsor: (a) Atomic Energy Commission, (b,c) Public Health Service.

U. S. CHEMICAL CENTER MEDICAL LABORATORIES, Army Chemical Center, Maryland. Contact: Keith J. Jacobson.

Studying the health hazards of exhausts from various high thrust motors. Also, studying the hazards from exposure to an aniline-furfuryl alcohol-hydrazine vapor mixture, fuming nitric acid, and methyl borate, as well as studying the level at which men detect odors of toxics. Results: Published as Chemical Center Medical Laboratories Research Reports, and in the AMA Archives of Industrial Health. Sponsor: Department of Defense.

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, Public Health Service, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

(a) Plant indicators of air pollution and air pollutants; (b) fluorine: a summary and evaluation of the problem of air pollution with fluorine and its compounds; (c) joint district, federal and state project for evaluation of refinery effluents; (d) fabric air filter design criteria studies; (e) incinerator design criteria studies; (f) cotton ginning operations air pollution studies; (g) assessing and devising instruments for continuous monitoring of air pollutants; (h) development of improved smoke inspection chart; (i) auto exhaust study evaluation; (j) development of analytical methods; (k) detailed analysis of air contaminants; (l) investigation of reactions of simple and multi-component systems of air pollutants; (m) adaptation of physical methods for analysis of air pollutants to field use; (n) the role of exotic air in local air pollution; (o) development and evaluation of non-biological indicators for presence of air pollution; (p) development and evaluation of field sampling equipment for air pollutants; (q) national air sampling network. Sponsor: Public Health Service.

U. S. FOREST SERVICE, 4 Forestry Building, University of California, Berkeley 4, California. Contact: H. R. Offord.

Effect of micro - and macro-climate on the spread and behavior of the fungus Croptartium ribicola. Results: Unpublished. Sponsor: U. S. Department of Agriculture.

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY, San Francisco 24, California
Contact: Paul C. Tompkins.

Instrumentation sampling, and chemical, physical and radioactive analysis of solid and liquid aerosols. Results: Several publications. Sponsor: Department of Defense.

U. S. PUBLIC HEALTH SERVICE, Communicable Disease Center, Technical Development Laboratories, P.O. Box 769, Savannah, Georgia. Contact: John M. Henderson.

(a) Development of a pollen sampler for use on aircraft; (b) adaptation of the millipore filter to pollen and air borne bacterial sampling; (c) high rate sampling of air borne bacteria by means of the tangential jet sampler; (d) a semi-automatic impinger type bacterial sampler. Results: Published in restricted reports. Sponsor: Public Health Service and the Federal Civil Defense Administration.

U. S. WEATHER BUREAU RESEARCH STATION, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

(a) Relationships between meteorological variables and community air pollution levels; (b) description and prediction of air pollution attacks; (c) feasibility of using models to investigate atmospheric transport and diffusion of pollutants. Sponsor: Public Health Service.

UTAH STATE AGRICULTURAL COLLEGE, Logan, Utah. Contacts: Director, D. W. Thorne, Project Leader, D. A. Greenwood.

(a) The effects of inorganic fluorides in plants and animals; (b) the effects of atmospheric fluorides on man. (This is a cooperative project being conducted by the Utah Valley Hospital, Utah State Health Department, University of Utah, and the Utah State Agricultural College) Results: Publications on the effects of fluorides on plants and animals. Sponsors: (a) Industry, State and Federal Governments, (b) Public Health Service and State of Utah.

WASHINGTON, STATE COLLEGE OF, Division of Industrial Research, Pullman, Wash.
Contact: Donald F. Adams.

(a) Continuous monitoring of the atmosphere for variations in radioactivity; (b) measurement of effluents from stacks; (c) automatic recorder for variations in atmospheric fluorides and sulfur dioxide; (d) study on improved method for analysis of fluorides in vegetation; (e) area surveys for variations in concentration of atmospheric pollutants with meteorological conditions; (f) area surveys for atmospheric pollution damage to vegetation; (g) controlled fumigations with hydrogen fluoride to determine typical damage patterns, relative susceptibility, and effect upon growth and production; histological studies of the effect of fluoride on cellular structure; and biochemical studies of effect of fluoride on various chemical constituents of leaves. Relationship of genetic variability and with the observed variations in foliar response of a given plant variety to equal fluoride fumigation levels; (h) Synergistic effect of hydrogen fluoride and sulfur dioxide upon selected plant species. Results: Various publications. Sponsors: Industry, farm groups, college funds, and Public Health Service.

WASHINGTON, UNIVERSITY OF

Department of Meteorology and Climatology, Seattle 5, Washington. Contact: Franklin I. Badgley.

Eddy Diffusivity - temperature distribution in the lowest few meters of the atmosphere, with the wind profile in the same layer, with the photographic study of small scale air currents in the same layer, and with the eddy diffusion of water vapor in the upper few centimeters of the earth and the lower few meters of the air. Results: Partially published in annual report. Sponsors: University of Washington and Atomic Energy Commission.

Environmental Research Laboratory, E. 314 Health Sciences Building, Seattle 5, Washington. Contact: Ross N. Kusian.

(a) Instrumentation in industrial hygiene and air pollution sampling techniques; (b) determination of trace amounts of ozone; (c) examination of reactions and analytical methods for sulfur in air pollution; (d) process components as natural tracers in air pollution; (e) turbulence studies in the lower atmosphere. Results: Many publications. Sponsor: Washington Department of Labor and Industries; University of Washington; Public Health Service; and Atomic Energy Commission.

WESTERN WASHINGTON EXPERIMENT STATION, Puyallup, Washington. Contact: C. D. Miller.

Development of tests to delineate areas of contamination by air borne fluoride. Sponsor: Washington State College.

WISCONSIN, UNIVERSITY OF, Madison 6, Wisconsin. Contact: Paul H. Phillips.

(a) Fluorosis in dairy cattle fed NaF; (b) fluorine metabolism in skeletal structures; (c) the physiologic role of fluorine in fluorine toxicosis; (d) long-time low-dose fluorine effects in the life time of the rat. Results: Published in part. Sponsor: Industry and foundation.

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